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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Brenner

Serial No.: 10/038,813

Filed: 31 December 2001

For: SEPARATING WAFERS COATED WITH PLASTIC FILMS

Art Unit: 2814

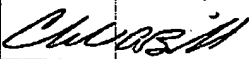
Examiner: Trinh, Hoa B.

Docket No.: TI-30637

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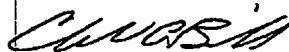
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Respectfully submitted,



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For: SEPARATING WAFERS COATED WITH PLASTIC FILMS

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TITLE OF INVENTION: SEPARATING WAFERS COATED WITH PLASTIC FILMS	
TI FILE NO.: TI-30637	DEPOSIT ACCT. NO.: 20-0668
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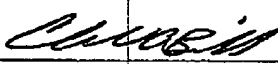
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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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	6 JULY 2005
Charles A. Brill	Date

Dear Sir:

The following Appeal Brief is respectfully submitted in connection with the above-identified application in response to the Final Rejection mailed 7 January 2005, and the Advisory Action mailed 2 May 2005. Please charge all required fees, including any extension of time fees, to the deposit account of Texas Instruments Incorporated, Deposit Account No. 20-0668.

REAL PARTY IN INTEREST

The real party in interest is Texas Instruments Incorporated, to whom this application is assigned.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to the Applicant's legal representative.

TI-30637 Appeal Brief - Page 1 of 13

STATUS OF THE CLAIMS

This application was filed on 31 December 2001 with twenty three claims, one of which was written in independent form. No claims have been amended or added. All claims, Claims 1-23, have been rejected and are under appeal.

STATUS OF THE AMENDMENTS

A response to the final rejection was submitted on 14 April 2005. The response after final rejection did not amend any claims, and the Examiner indicated it would be entered for purposes of appeal.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention provides a useful process that enables devices, such as micromirror arrays and other micro-electro-mechanical systems, to be tested prior to wafer separation and packaging. In the case of micromirror arrays, the package and optical window are very expensive. Therefore, the ability to test the micromirror arrays in wafer form and package only the known good die is extremely important. To enable the device to be tested, the sacrificial layers supporting the mirror array during fabrication are removed. The mirrors are then prone to damage from debris or other contact and must be protected during the wafer separation and packaging steps.

The micromechanical device is protected during the wafer separation process by a protective layer. The protective layer is difficult to establish and remove without damage to the fragile micromechanical components. The protective overcoat is described on page 9 of the specification. In general, the materials that are suitable for protective overcoat layers are easily sawn when the wafer is sawn. Unfortunately, as described in lines 4-12 of page 10, the overcoat layers tend to be slightly plastic. This leads to deformation and

delamination during the saw process and damage to the underlying micromechanical elements. The present invention teaches the use of a brittle layer over the protective layer to prevent damage from the deformation and delamination of the protective layer. The combination of a protective layer and a brittle layer allows the use of a protective layer that is selected for its ability to both encapsulate the micromechanical devices and be removed without damage to the devices. The brittle layer material may then be selected for its ability to prevent deformation and delamination damage without regard for its ability to be applied to an unprotected device.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether Claims 1-14 and 20-22 are anticipated under 35 U.S.C. § 102 (e) by U.S. Patent No. 6,335,224 B1 to Peterson *et al.* ("Peterson").
2. Whether Claims 15 and 18 are anticipated under 35 U.S.C. § 102 (e) by Peterson.
3. Whether Claims 16 and 19 are anticipated under 35 U.S.C. § 102 (e) by Peterson.
4. Whether Claim 17 is anticipated under 35 U.S.C. § 102 (e) by Peterson.
5. Whether Claim 23 is anticipated under 35 U.S.C. § 102 (e) by Peterson.

ARGUMENT

Ground of Rejection 1:

Claims 1-14 and 20-22 were rejected as anticipated under 35 U.S.C. § 102 (e) by U.S. Patent No. 6,335,224 B1 to Peterson *et al.* ("Peterson"). The applicant respectfully disagrees and submits the Examiner has failed to meet the burden of proof required to establish a *prima facie* case of anticipation.

"A person shall be entitled to a patent unless," creates an initial presumption of patentability in favor of the applicant. 35 U.S.C. § 102. "We think the precise language

of 35 U.S.C. § 102 that, “a person shall be entitled to a patent unless,” concerning novelty and unobviousness, clearly places a burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103, see *Graham and Adams*.” *In re Warner*, 379 F.2d 1011, 1016 (C.C.P.A. 1967) (referencing *Graham v. John Deere Co.*, 383 U.S. 1 (1966) and *United States v. Adams*, 383 U.S. 39 (1966)). “As adapted to *ex parte* procedure, *Graham* is interpreted as continuing to place the ‘burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103’.” *In re Piasecki*, 745 F.2d 1468 (Fed. Cir. 1984) (citing *In re Warner*, 379 F.2d at 1016).

“The *prima facie* case is a procedural tool which, as used in patent examination (as by courts in general), means not only that the evidence of the prior art would reasonably allow the conclusion the examiner seeks, but also that the prior art compels such a conclusion if the applicant produces no evidence or argument to rebut it.” *In re Spada*, 911 F.2d 705, 708 n.3 (Fed. Cir. 1990).

Section 2131 of the Manual of Patent Examiner’s Procedure provides:

“‘A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference.’ *Verdegaal Bros. v. Union Oil Co. Of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053, (Fed. Cir. 1987). . . . ‘The identical invention must be shown in as complete detail as contained in the . . . claim.’ *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as in the claim under review *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).”

Claim 1 recites, “fabricating at least two micromechanical structures on a substrate; overcoating said micromechanical structures with a protective layer; overcoating said protective layer with a brittle layer; and sawing said brittle layer and said protective layer.”

The Examiner stated, with respect to Claim 1 and Peterson, “protective layer 14; overcoating said protective layer with a brittle layer (col. 8, lines 65-67).”

The applicant submits the Examiner clearly is misinterpreting Peterson. Peterson states “MEMS elements 24 are protected by coating 14 from damage from cutting debris and lubricant fluids that are typically used during wafer dicing. Alternatively, protective coating 14 could be patterned in a manner to exclude coating 14 from the wafer saw streets (e.g. lines where the saw cuts along), prior to saw cutting. This would be desirable to avoid organic debris generated by cutting of coating 14. Exclusion of coating 14 from the wafer saw streets can be accomplished by masking during deposition of the coating. Alternatively, the coating can be removed from the wafer’s saw streets by wet or dry etching using a patterned mask. An optional cleaning step can be performed after dicing wafer 22” (line 53 of column 8 through line 4 of column 9).

Peterson therefore teaches either cutting the protective layer as deposited, or excluding the protective layer from the saw streets. Peterson does not show, teach, or suggest “overcoating said protective layer with a brittle layer.”

The Examiner stated, “applicants admit that Peterson teaches in addition of making the device an alternative way of making the device is providing the ‘protective coating to be patterned in a manner to exclude coating from the wafer saw streets prior to

saw cutting'; otherwise overcoating the protective layer with a brittle layer is known in the art, as the applicant claimed in the present invention."

While it is far from clear what the Examiner intended by the above statement, the Examiner has failed to point to any teaching in Peterson of "overcoating said protective layer with a brittle layer." The Examiner therefore has failed to present a *prima facie* case of anticipation and the rejection should be withdrawn.

Ground of Rejection 2:

Claims 15 and 18 were rejected as anticipated under 35 U.S.C. § 102 (e) by Peterson. The applicant respectfully disagrees and submits the Examiner has failed to meet the burden of proof required to establish a *prima facie* case of anticipation.

Claims 15 and 18 depend from Claim 1 and should be deemed allowable for that reason and on their own merits. For the reasons stated above with respect to Claim 1, the Examiner has failed to present a *prima facie* case of anticipation of Claim 1, much less of Claims 15 and 18.

Claim 15 recites, "thermally curing said protective layer." Claim 18 recites, "baking said photoresist layer." The Examiner stated, "the step includes thermally curing said protective layer 14. See col. 6, lines 9-15."

The passage cited by the Examiner states, "During the deposition stage, the active (cured) monomeric gas polymerizes spontaneously on the surface of coated specimen at ambient temperature with no stresses induced initially or subsequently. In short, there are no cure-related hydraulic or liquid surface tension forces in the process. Parylenes are formed at a vacuum of approximately 0.1 torr, and under these conditions the mean-free-path of the gas molecules in the deposition chamber is in the order of 0.1 cm." The

passage cited by the Examiner actually teaches away from the limitations of Claims 15 and 18 by stating the “monomeric gas polymerizes spontaneously on the surface of coated specimen at ambient temperature.” The Examiner therefore has failed to present a *prima facie* case of anticipation and the rejection should be withdrawn.

Ground of Rejection 3:

Claims 16 and 19 were rejected as anticipated under 35 U.S.C. § 102 (e) by Peterson. The applicant respectfully disagrees and submits the Examiner has failed to meet the burden of proof required to establish a *prima facie* case of anticipation.

Claims 16 and 19 depend from Claim 1 and should be deemed allowable for that reason and on their own merits. For the reasons stated above with respect to Claim 1, the Examiner has failed to present a *prima facie* case of anticipation of Claim 1, much less of Claims 16 and 19.

Claim 16 recites, “curing said protective layer using ultraviolet light.” Claim 19 recites, “deep UV hardening said photoresist layer.”

The Examiner stated, “As to claim 16, 19, curing the protective layer 14 using ultraviolet light. See col. 6, lines 1-15.”

The passage cited by the Examiner states, “Then is molecularly cleaved (e.g. pyrolyzed) in a second process at about 690 degrees C. to form the diradical, para-xylylene, which is then introduced as a monomeric gas that polymerized on the specimens in the vacuum chamber at room temperature. There is no liquid phase in the deposition process, and specimen temperatures remain near ambient. The coating grows as a pure, defect-free, self-assembling, conformal film on all exposed surfaces, edges, and

crevices. During the deposition stage, the active (cured) monomeric gas polymerizes spontaneously on the surface of coated specimen at ambient temperature with no stresses induced initially or subsequently. In short, there are no cure-related hydraulic or liquid surface tension forces in the process. Parylenes are formed at a vacuum of approximately 0.1 torr, and under these conditions the mean-free-path of the gas molecules in the deposition chamber is in the order of 0.1 cm.”

The passage cited by the Examiner seems unrelated to the limitations of Claims 16 and 19. The Examiner therefore has failed to present a *prima facie* case of anticipation and the rejection should be withdrawn.

Ground of Rejection 4:

Claim 17 was rejected as anticipated under 35 U.S.C. § 102 (e) by Peterson. The applicant respectfully disagrees and submits the Examiner has failed to meet the burden of proof required to establish a *prima facie* case of anticipation.

Claims 17 depends from Claim 1 and should be deemed allowable for that reason and on its own merits. For the reasons stated above with respect to Claim 1, the Examiner has failed to present a *prima facie* case of anticipation of Claim 1, much less of Claim 17.

Claim 17 recites, “said overcoating with a brittle layer comprising overcoating with a photoresist layer.”

The Examiner stated, “As to claim 17, said overcoating with a brittle layer comprising overcoating with a photoresist layer 26. See col. 8, lines 1-5.”

The passage cited by the Examiner states, "FIG. 2B shows a schematic cross-section view of a second example, according to the present invention, that is similar to FIG. 2A, after an optional anti-stiction coating 26 has been applied to the released MEMS elements 24. A schematic MEMS device 40 is shown, having MEMS elements 24 comprising two polysilicon gears 42, 44 and a linkage bar 46."

The passage cited by the Examiner once again seems unrelated to the limitations of Claim 17. The Examiner therefore has failed to present a *prima facie* case of anticipation and the rejection should be withdrawn.

Ground of Rejection 5:

Claim 23 was rejected as anticipated under 35 U.S.C. § 102 (e) by Peterson. The applicant respectfully disagrees and submits the Examiner has failed to meet the burden of proof required to establish a *prima facie* case of anticipation.

Claims 23 depends from Claim 1 and should be deemed allowable for that reason and on its own merits. For the reasons stated above with respect to Claim 1, the Examiner has failed to present a *prima facie* case of anticipation of Claim 1, much less of Claim 23.

Claim 23 recites, "sawing through said protective and overcoat layers and partially through said substrate layer" (emphasis added).

The Examiner made no effort to show Peterson teaches the limitations of Claim 23. The Examiner therefore has failed to present a *prima facie* case of anticipation and the rejection should be withdrawn.

CONCLUSION

For the foregoing reasons, Appellants respectfully submit that the Examiner's final rejection of Claims 1-23 is improper, and it is respectfully requested that the Board of Patent Appeals and Interferences so find and reverse the Examiner's rejection.

Please charge any fees necessary in connection with the filing of this paper, including any necessary extension of time fees, to Deposit Account No. 20-0668 of Texas Instruments Incorporated.

Respectfully submitted,



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CLAIMS APPENDIX

1. (Original) A method of fabricating a micromechanical structure, the method comprising:

 fabricating at least two micromechanical structures on a substrate;

 overcoating said micromechanical structures with a protective layer;

 overcoating said protective layer with a brittle layer; and

 sawing said brittle layer and said protective layer.
2. (Original) The method of Claim 1, said fabricating comprising fabricating at least two micromechanical devices on a semiconductor substrate.
3. (Original) The method of Claim 1, said fabricating comprising fabricating at least two micromirror devices on said substrate.
4. (Original) The method of Claim 1, said fabricating comprising fabricating at least two micromirror devices on a semiconductor substrate.
5. (Original) The method of Claim 1, said fabricating comprising fabricating at least two micromirror arrays on said substrate.
6. (Original) The method of Claim 1, said fabricating comprising fabricating at least two micromirror arrays on a semiconductor substrate.
7. (Original) The method of Claim 1, said overcoating with a protective layer comprising overcoating with a plastic layer.
8. (Original) The method of Claim 1, said overcoating with a protective layer comprising overcoating with a polymer resin.
9. (Original) The method of Claim 1, said overcoating with a protective layer comprising overcoating with a PARYLENE layer.

10. (Original) The method of Claim 1, said overcoating with a protective layer comprising overcoating with a acrylate monomer layer.
11. (Original) The method of Claim 1, said overcoating with a protective layer comprising overcoating with a acrylate oligomer layer.
12. (Original) The method of Claim 1, said overcoating with a protective layer comprising applying a protective overcoat by vapor deposition.
13. (Original) The method of Claim 1, said overcoating with a protective layer comprising applying a protective overcoat by immersing said substrate in a liquid protective overcoat material.
14. (Original) The method of Claim 1, said overcoating with a protective layer comprising applying a protective overcoat by spinning-on a protective overcoat layer.
15. (Original) The method of Claim 1, comprising:
thermally curing said protective layer.
16. (Original) The method of Claim 1, comprising:
curing said protective layer using ultraviolet light.
17. (Original) The method of Claim 1, said overcoating with a brittle layer comprising overcoating with a photoresist layer.
18. (Original) The method of Claim 1, said overcoating with a brittle layer comprising overcoating with a photoresist layer, further comprising:
baking said photoresist layer.
19. (Original) The method of Claim 1, said overcoating with a brittle layer comprising overcoating with a photoresist layer, further comprising:

deep UV hardening said photoresist layer.

20. (Original) The method of Claim 1, said overcoating with a brittle layer comprising overcoating with a brittle layer to prevent said protective layer from delaminating from said substrate.
21. (Original) The method of Claim 1, said sawing comprising sawing through said protective and overcoat layers.
22. (Original) The method of Claim 1, said sawing comprising sawing through said protective and overcoat layers and said substrate to separate said micromechanical devices.
23. (Original) The method of Claim 1, said sawing comprising sawing through said protective and overcoat layers and partially through said substrate layer.

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